

Appendix H

Aquatic and Riparian Habitat Restoration Objectives

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Aquatic and Riparian Habitat Restoration Objectives for the 1 ½ Mile Reach

This attachment describes habitat restoration objectives (HROs) for the 1 ½ Mile Reach. These objectives, first presented in an Engineering Evaluation/Cost Analysis report (R.F. Weston, 2000) prepared in February 2000, are described in more detail below. HROs have been developed to insure that the functions and values that the aquatic and riparian habitat provide are maintained and enhanced following the removal action, and that restoration is performed in accordance with the Consent Decree agreed by GE, the Trustees, USEPA, the Commonwealth of Massachusetts, the City of Pittsfield, the Pittsfield Economic Development Authority, and the State of Connecticut. This attachment also provides examples of methods that can be used to restore and enhance habitat in an ecologically sound manner.

General HROs originally presented in the EE/CA report were as follows:

- Implement the Removal Action for the 1 ½ Mile Reach as approved by EPA;
- Perform the restoration, including the enhancement of the river sediment and bank habitat, to increase the diversity and productivity of the biological community;
- Restore the riverbank to provide overlying cover, to enhance the bank vegetation by establishing plantings using native species; and
- Minimize the potential for erosion of residual PCB-containing bank soils and river sediments that would result in recontamination of river sediments or transport of PCBs, and which could impair the river restoration by adversely impacting the ecological receptors.

The riparian HROs were re-evaluated based on the planting requirements and specifications described in the EE/CA and were found to be acceptable for meeting the restoration objectives. These HROs have not been changed. The results of the aquatic habitat assessment were used to more fully develop the aquatic HROs. The aquatic HROs for the 1 ½ Mile Reach will be supplemented as follows:

- *Increase the variability in velocity and in low-flow channel width.* Stream velocity is the speed at which water flows in the river channel. The low-flow channel width is the area that the stream occupies during typical low-flow periods, usually late summer. Velocity changes in the stream as water passes over and around objects such as large woody debris (i.e., dead trees) and boulders. Increased velocities occur along the edges of the object, and decreased velocities occur in eddies that typically form behind the debris. Increased velocities increase oxygen exchange and enhance habitat, while decreased velocities in eddies and pools enhance habitat by providing feeding cover for fish. Increasing the variability of the low-flow channel width increases natural diversity in the stream by changing the flow dynamics and providing more types of habitat for aquatic species. It also enhances habitat value by decreasing stream homogeneity, like that currently found in previously channelized portions of the 1 ½ Mile Reach.

- *Increase the diversity and amount of substrate cover types and water turbulence cover types.* Substrate cover types can include cobbles, large rocks, boulders, and large woody debris. These cover types provide feeding and cover habitat for fish and macroinvertebrates. Water turbulence cover is typically provided by riffles in the river, which visually obstruct views into the water from above. Piscivorous birds, such as belted kingfishers, are unable to forage in these areas because they can't see the fish through the turbulence.

The methods and materials proposed to achieve these objectives include installing single- and double-wing deflectors, rock weirs (e.g., W, vortex, and J), and individual and clustered boulder and cobble placements. Appropriate methods and materials will be chosen during design to insure that erosion does not occur in undesirable locations.